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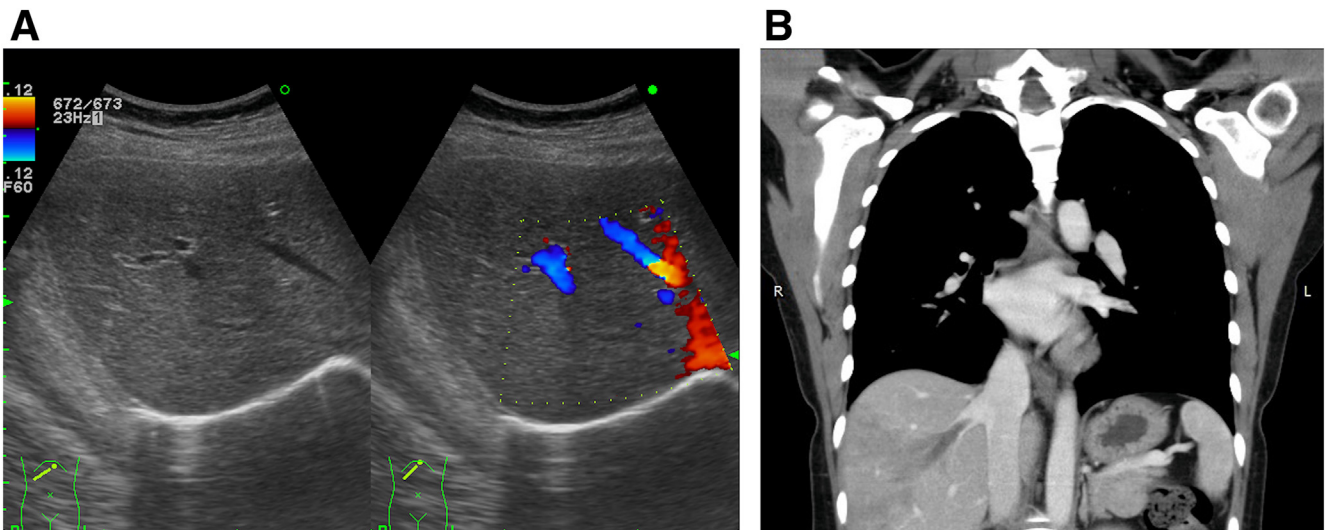
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Unusual Fever, Headache, and Abdominal Pain in a Healthy Woman



Chia-Yi Lin,¹ Ching-Hsiang Wang,² and Po-Jen Hsiao^{3,4,5}

¹Department of Internal Medicine, Taoyuan Armed Forces General Hospital, Taoyuan, Taiwan; ²Division of Gastroenterology, Department of Internal Medicine, Taoyuan Armed Forces General Hospital, Taoyuan, Taiwan; ³Division of Nephrology, Department of Internal Medicine, Taoyuan Armed Forces General Hospital, Taoyuan, Taiwan; ⁴Division of Nephrology, Department of Internal Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan; and ⁵Department of Life Sciences, National Central University, Taoyuan, Taiwan



Question: A healthy, 42-year-old woman was admitted with a 3-day history of fever and headache 5 days after the first vaccination with ChAdOx1 nCoV-19 (AstraZeneca). She had not received hormone replacement therapy or oral contraceptives previously. The polymerase chain reaction test for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was negative. The results of urinalysis and pregnancy test were negative. Brain contrast-enhanced magnetic resonance venography confirmed cerebral sinus-venous thrombosis. Laboratory studies indicated decreased platelet count (30,000/ mL^3), a high D-dimer level ($>10,000 \text{ ng/mL}$; reference value, $\leq 500 \text{ ng/mL}$), and high antiplatelet factor 4 antibody (PF4) level (optical density, 0.634; reference value, ≤ 0.4). Test results for prothrombin time, activated partial thromboplastin time, antithrombin, and protein C and protein S levels were normal. Screening tests for autoimmune antibodies and thrombotic thrombocytopenic purpura were all negative.

She also complained of upper abdominal pain and bilateral legs edema. Mild impaired liver function tests without jaundice were found. Bedside Doppler ultrasound examination revealed no flow in her right hepatic vein (Figure A). A contrast-enhanced computed tomography scan demonstrated the thrombosis and occlusion in her right hepatic vein (Figure B).

Medical treatments including intravenous immunoglobulin, oral anticoagulants, and steroids were administered. During her 3-week hospital stay, the fever, headache, and abdominal pain subsided gradually. Platelet count, D-dimer, and PF4 test results improved. Doppler ultrasound examination showed apparent progress in blood flow to the right hepatic vein 6 weeks later.

What are the causes of the abdominal pain in this patient?

CLINICAL CHALLENGES AND IMAGES IN GI

Look on page 1389 for the answer and see the *Gastroenterology* web site (www.gastrojournal.org) for more information on submitting your favorite image to Clinical Challenges and Images in GI.

Correspondence:

Address correspondence to: Po Jen Hsiao, MD, Division of Nephrology, Department of Internal Medicine, Taoyuan Armed Forces General Hospital, Taiwan, No.168, Zhongxing Road, Longtan District, Taoyuan City 325, Taiwan. e-mail: doc10510@afgh.gov.tw or a2005a660820@yahoo.com.tw.

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Conflicts of interest

The authors disclose no conflicts.

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Answer to: Image 3 (Page 1387): COVID-19 Vaccine-Induced Immune Thrombosis and Thrombocytopenia

To date, there is no literature in PubMed and Scopus focused on vaccine-induced hepatic vein thrombosis with occlusion (Budd–Chiari syndrome [BCS]). This case report is the first of coronavirus disease 2019 (COVID-19) vaccine-induced immune thrombosis and thrombocytopenia (VITT) complicated by BCS. The pathophysiology of VITT is presumably the development of antibodies against PF4, resulting in platelet depletion with thrombocytopenia and thrombus formation.^{1,2} Treatments include intravenous immunoglobulin, methylprednisolone, and oral anticoagulants.^{1,2}

The COVID-19 vaccines remain critical for the control of SARS-CoV-2; early diagnosis and management of VITT is imperative for physicians. The primary origin of BCS is usually in a pro-coagulant state resulting in venous thrombosis, whereas secondary cause can be associated extrinsic compression of the hepatic veins or tumor invasion. Clinical manifestations are varied greatly, from incidentally discovered asymptomatic thrombosis to fulminant liver failure.³ Doppler ultrasound examination is the first-line key diagnostic tool, which is easily available, cost effective, and lacks ionizing radiation. It has a sensitivity and specificity of approximately 85% for the diagnosis of BCS.³ A contrast-enhanced computed tomography scan is a commonly performed imaging study for BCS. It can help to delineate the vascular abnormality and evaluate the hepatic morphologic changes, as well as mapping the vascular anatomy before surgical interventions.³

Keywords: ChAdOx1 COVID-19 (AstraZeneca) Vaccine; Platelet Factor 4 (PF4) Antibodies; Hepatic Vein Thrombosis; Budd–Chiari Syndrome.

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